CLAIMS

1. A chimeric glycosylated soluble interleukin-6 receptor (sIL-6R)-interleukin-6 (IL-6) protein (sIL-6R/IL-6) and biologically active analogs thereof, comprising a fusion protein product between essentially all of the naturally occurring form of sIL-6R and essentially all of the naturally occurring form of IL-6, said sIL-6R/IL-6 and analogs thereof being glycosylated in a similar fashion to the glycosylation of naturally occurring sIL-6R and IL-6.

2. A chimeric sIL-6R/IL-6 protein and biologically active analogs thereof according to claim 1, wherein said sIL-6R is fused to IL-6 via a peptide linker molecule.

3. A chimeric sIL-6R/IL-6 protein and biologically active analogs thereof according to claim 2, wherein said linker is a very short, non-immunogenic linker of about 3 amino acid residues.

4. A chimeric sIL-6R/IL-6 protein and biologically active analogs thereof according to claim 3, wherein said linker is a tripeptide of the sequence E-F-M (Glu-Phe-Met).

5. A chimeric sIL-6R/IL-6 protein and biologically active analogs thereof according to claim 2, wherein said linker is a peptide of 13 amino acid residues of sequence E-F-G-A-G-L-V-L-G-G-Q-F-M (Glu-Phe-Gly-Ala-Gly-Leu-Val-Leu-Gly-Gly-Gln-Phe-Met).

6. A chimeric sIL-6R/IL-6 protein according to ~~any one of claims 1-4,~~ Claim 1 being the herein designated sIL-6RδVal/IL-6 having a tripeptide linker of sequence

E-F-M between the C-terminal Val-356 of sIL-6R and the N-terminal Pro-29 of IL-6R, said chimeric protein having the sequence set forth in Fig. 3.

7. A chimeric sIL-6R/IL-6 protein according to ~~any one of claims 1, 2, and 5,~~ being the herein designated sIL-6RδVal/LXIL-6 having a 13 amino acid peptide linker of sequence E-F-G-A-G-L-V-L-G-G-Q-F-M between the C-terminal Val-356 of sIL-6R and the N-terminal Pro-29 of ~~IL-6R,~~ said chimeric protein having the sequence set forth in Fig. 3 wherein the tripeptide of sequence E-F-M between positions 357-359 of Fig. 3 is replaced by said 13 amino acid peptide sequence.

8. A chimeric sIL-6R/IL-6 protein according to claim 1 being the herein designated IL-6/sIL-6R having ~~the entire~~ sequence of IL-6 preceeding the sIL-6R sequence with a 14 amino acid peptide linker of sequence G-G-G-G-D-P-G-G-G-G-G-G-P-G (SEQ ID NO: 6) between the C-terminal MET-212 of IL-6 and the VAL-112 of sIL-6R, said chimeric protein having the sequence set forth in Fig. 11.

9. A chimeric sIL-6R/IL-6 protein according to ~~any one of claims 1-8~~, wherein said protein is produced in mammalian cells in a fully processed form.

10. A chimeric sIL-6R/IL-6 protein according to claim 9, wherein said protein is produced in human cells.

11. A chimeric sIL-6R/IL-6 protein according to claim 9, wherein said protein is produced in CHO cells.

12. A chimeric sIL-6R/IL-6 protein and biologically active analogs thereof according to ~~any one of claims 1-11~~ Claim 1, wherein said chimeric protein and analogs are characterized by being capable of inhibiting the growth of highly malignant cancer cells.

13. A chimeric sIL-6R/IL-6 protein and biologically active analogs thereof according to claim 12, wherein said chimeric protein and analogs are characterized by being capable of inhibiting the growth of highly malignant melanoma cells.

14. A chimeric sIL-6R/IL-6 protein and biologically active analogs thereof according to ~~any one of claims 1-11~~ Claim 1, wherein said chimeric protein and analogs are characterized by being capable of eliciting the *in vivo* engraftment of human hematopoietic cells in bone marrow transplantations.

15. A chimeric sIL-6R/IL-6 protein and biologically active analogs thereof according to ~~any one of claims 1-11,~~ Claim 1 wherein said chimeric protein and analogs are characterized by being capable of protecting liver from hepatotoxic agents.

16. A DNA sequence encoding a chimeric sIL-6R/IL-6 protein and biologically active analogs thereof according to ~~any one of claims 1-11.~~ Claim 1

17. A DNA vector comprising a DNA sequence encoding a chimeric sIL-6R/IL-6 protein and biologically active analogs thereof according to ~~any one of claims 1-11~~ Claim 1, said vector being suitable for expression of said chimeric protein in mammalian cells.

18. A DNA vector according to claim 17, wherein said vector is suitable for expression of said chimeric protein in human cells.

19. A DNA vector according to claim 17, wherein said vector is suitable for expression of said chimeric protein in CHO cells.

20. A DNA vector according to ~~claim 17-19,~~ wherein when said vector is expressed in mammalian or human cells, the expressed chimeric protein has a sequence that permits full processing of the chimeric protein by the mammalian or human cells and secretion of the fully processed chimeric protein from the cells into the culture medium in which said cells are grown.

21. A DNA vector according to ~~any one of claims 17-20,~~ wherein said vector is the herein designated plasmid pcDNAsIL-6R/IL-6 comprising a pcDNA3 vector containing the DNA sequence encoding the chimeric sIL-6R/IL-6 protein under the control of a cytomegalovirus (CMV) promoter.

22. A DNA vector according to ~~any one of claims 17-20,~~ wherein said vector is the herein designated plasmid pcDNA sIL-6R/L/IL-6 comprising a pcDNA3 vector containing the DNA sequence encoding the chimeric sIL-6R/IL-6 protein under the control of a cytomegalovirus (CMV) promoter, and wherein in said DNA sequence encoding said chimeric sIL-6R/IL-6 protein there is inserted a linker sequence encoding a peptide linker at the EcoRI site placed between the sequence encoding the sIL-6R part and the sequence encoding the IL-6 part of the protein.

23. Transformed mammalian cells containing a DNA vector according to ~~any one of claims 17-22~~ which are capable of expressing the sIL-6R/IL-6 chimeric

protein sequence carried by said vector and of fully processing the expressed protein and secreting it into the culture medium in which said cells are grown.

24. Tranformed cells according to claim 23 wherein in said cells are the herein described human embryonal kidney cells 293 (HEK293) transfected by the pcDNA sIL-6R/Il-6 vector, said cells being capable of expressing the sIL-6R/IL-6 chimeric protein, fully processing said protein and secreting said protein into the culture medium in which said cells are grown in the form of an about 85 kDa glycoprotein.

25. A method for producing a chimeric protein or biologically active analogs thereof according to ~~any one of claims 1-14,~~ Claim 1 comprising growing transformed cells according to claim 23 or 24 under conditions suitable for expression, processing and secretion of said protein or analogs into the culture medium in which said cells are grown; and purifying said protein or analogs from said culture medium.

26. A method according to claim 25, wherein the purification is carried out by immunoaffinity chromatography using monoclonal antibodies specific for sIL-6R.

27. The use of a chimeric sIL-6R/IL-6 protein or analogs according to ~~any one of claims 1-11,~~ Claim 1 salts of any one thereof, and mixtures thereof, as an inhibitor of cancer cells.

28. The use of a chimeric protein or analog according to claim 27, as an inhibitor of highly malignant melanoma cells.

29. The use of a chimeric sIL-6R/IL-6 protein or analogs according to ~~any one of claims 1-11,~~ Claim 1 salts of any one thereof, and mixtures thereof, as an active ingredient

for eliciting engraftment of human hematopoietic cells in bone marrow transplantation.

30. The use of a chimeric sIL-6R/IL-6 protein or analogs according to ~~any one of claims 1-11,~~ Claim 1 salts of any one thereof, and mixtures thereof, as an active ingredient for protecting liver against hepatotoxic agents.

31. The use of a chimeric sIL-6R/IL-6 protein or analogs according to ~~any one of claims 1-11~~ Claim 1, salts of any one thereof, and mixtures thereof, as an active ingredient for increasing hematopoiesis, for treating liver or neurological conditions, or for other applications in which IL-6 or sIL-6R are used.

32. A chimeric sIL-6R/IL-6 protein or analogs according to ~~any one of claims 1-11,~~ Claim 1 salts of any one thereof and mixtures thereof, for use in the preparation of a medicament for treating mammalian cancers by way of inhibition of mammalian cancer cells, or in the preparation of a medicament for enhancement of bone marrow transplantation by way of eliciting engraftment of human hematopoietic cells in bone marrow transplantation, or in the preparation of a medicament for increasing hematopoeisis, or in the preparation of a medicament for treating liver or neurological disorders, or in the preparation of a medicament for other applications in which IL-6 or sIL-6R are used.

33. A pharmaceutical composition comprising as active ingredient a chimeric sIL-6R/IL-6 protein or analog thereof according to ~~any one of claims 1-11,~~ Claim 1 and a pharmaceutically acceptable carrier, diluent or excipient.

34. A pharmaceutical composition according to claim 33 for the treatment of cancers.

35. A pharmaceutical composition according to claim 33 for the enhancement of bone marrow transplantation.

36. A pharmaceutical composition according to claim 33 for the treatment of liver or neurological disorders, or for increasing hematopoeisis or for other applications in which IL-6 or sIL-6R are used.

37. A method for treating cancers in mammals, or for enhancing bone marrow transplantations, or for treating liver or neurological disorders, or for increasing hematopoiesis, or for other applications in which IL-6 or sIL-6R are used, comprising administering to a patient a pharmaceutical composition according to ~~any one of claims 33-36~~ claim 33 in a suitable dosage form and by a suitable route of administration.